

CLAIMS

1. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and a projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body; and

a pair of frame members (25 and 27) that is members useful in wearing the head-mounted image display device on the head, and is supported by said frame supporting members so that the frame members can pivot freely;

wherein said respective pair to the frame supporting members has the same shape.

2. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and a projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device HMD comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body; and

a pair of frame members (25 and 27) that is members useful in wearing said head-mounted image display device HMD on the head, and is supported by said frame supporting members so that the frame members can pivot freely,

wherein said frame member has ribs (27a or 25a) formed on the outer surface thereof which faces outside with said head-mounted image display device worn on the head, said ribs being extended over an effective range in the longitudinal direction of the frame member.

3. The head-mounted image display device HMD according to Claim 2, wherein:

said ribs on each frame member are a plurality of ribs lined in the width direction of the frame member; and

a groove defined with the inner surfaces of said ribs serves as a passage groove for an earphone cord (20 or 21).

4. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and an image projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body; and

a pair of frame members (25 and 27) that is members useful in wearing said head-mounted image display device HMD on the head, and is supported by said pair of frame supporting members so that the frame members can pivot freely,

wherein said frame member has facing pins (25b and 25c or 27b and 27c) formed on the inner surfaces of flanges constituting the proximal portion thereof that acts as a fulcrum; and

said frame supporting member has pin supporting holes (16d and 16j or 17d and 17j), into which said pins are fitted, bored therein.

5. The head-mounted image display device HMD according to Claim 4, wherein an axis (Y1 or Y2) linking said facing pins formed on each frame member is inclined by a predetermined angle relative to a major axis plane defined in the frame member.

6. The head-mounted image display device according to Claim 4, wherein said frame member can be attached to or detached from said frame supporting member by elastically deforming said flanges.

7. The head-mounted image display device according to Claim 6, wherein:

an L-shaped groove (16f or 16g) is formed in one direction along each of said pin supporting holes formed in said frame support member; and

said frame member is moved along said L-shaped grooves and then attached or detached.

8. The head-mounted image display device according to Claim 6, wherein said frame member is attached to or detached from said frame supporting member while being folded substantially into a portable or storable state.

9. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and a projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body;

a pair of frame members (25 and 27) that is members useful in wearing said head-mounted image display device on the head, and is supported by said pair of frame supporting members so that the frame members can pivot freely;

frame spreading magnitude changing devices (26 and 28) each of which is attached to said frame member so that the

device can move relative to said frame member, and is used to adjust an angle of pivot by which the frame member pivots, wherein said frame spreading magnitude changing devices is moved relative to said frame member so that the device will have distal projections thereof inserted into or withdrawn from gaps between the contacting portions of said frame supporting member and the contacting portions (25i and 25j or 27i and 27j) of said frame member, whereby a pivot angle by which said frame member can pivot is adjusted at least in two steps.

10. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and a projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body;

a pair of frame members (25 and 27) that is members useful in wearing said head-mounted image display device HMD on the head, and is supported by said pair of frame supporting members so that the frame members can pivot freely; and

frame spreading magnitude changing devices (26 and 28) each of which is attached to said frame member so that the device can move relative to said frame member, and is used to adjust a pivot angle by which the frame member can pivot,

wherein said frame spreading magnitude changing devices is moved relative to said frame member so that the device will have distal projections thereof inserted into or withdrawn from gaps between the contacting portions of said frame supporting member and the contacting portions (25i and 25j or 27i and 27j) of said frame member, whereby the pivot angle by which said frame member can pivot is adjusted to be any position that is not a stepwise specified position.

11. The head-mounted image display device HMD according to Claim 9 or 10, wherein said frame spreading magnitude changing devices are realized with a pair of members, and respective said pair to the members is the same shape.

12. The head-mounted image display device HMD according to Claim 9 or 10, wherein:

    said frame member has a plurality of ribs (25a or 27a) lined in the width direction on an outer surface thereof that faces outside with said head-mounted image display device worn on the head, and said plurality of ribs are extended over an effective range in the longitudinal direction of the frame member;

    said frame spreading magnitude changing device is

attached to cover said ribs; and

a groove defined with said ribs and having a portion thereof covered by the frame spreading magnitude changing device is used as an earphone cord passage groove.

13. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and a projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body; and

a pair of frame members (25 and 27) that is members useful in wearing said head-mounted image display device HMD on the head, and is supported by said frame supporting members so that the frame members can pivot freely,

wherein earphone holders (25d, 25e, and 25f or 27d, 27e, and 27f) are formed in the distal portion of said frame member.

14. The head-mounted image display device HMD according to Claim 13, wherein:

said earphone holder includes an opening, to which the speaker surface of said earphone is faced, and claws that

clamp the body of said earphone, that are faced to each other in the horizontal direction, and that can deform elastically.

15. A head-mounted image display device having an image producing unit (2) which includes an image display means (13a and 13b) and a projecting optical system (12a, 12b, 14a, and 14b) for projecting an image, which is produced by said image display means, on the observer's eyes, said head-mounted image display device comprising:

a casing body (11 and 22) in which said image producing unit is incorporated;

a pair of frame supporting members (16 and 17) fixed to said casing body; and

a pair of frame members (25 and 27) that is members useful in wearing said head-mounted image display device HMD on the head, and is supported by said frame supporting members so that the frame members can pivot freely,

wherein said frame member has a distal portion thereof shifted down by a predetermined dimension with respect to a major axis plane (P1) defined in the proximal portion of said frame member that acts as a fulcrum.

16. The head-mounted image display device HMD according to Claim 15, wherein said paired frame members or said paired frame supporting members can be replaced with each other.